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EXPANDED SITE INSPECTION REPORT
SMOKEY MOUNTAIN SMELTERS
KNOX COUNTY, TENNESSEE 37920
U.S. EPA ID # TN0002318277
TN DIVISION OF REMEDIATION SITE # 47559

10620017

1. INTRODUCTION

Under authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), the United States Environmental Protection Agency (U.S. EPA) conducted an Expanded Site Inspection (ESI) at the Smokey Mountain Smelters Site in Knox County, Tennessee, 37920. The Tennessee Division of Remediation (DOR), formerly the Division of Superfund (TDSF), under contract with the U.S. EPA, prepared and issued this ESI Report. This Site was assigned the identification number of TN0002318277 by the U.S. EPA (Ref 44), and 47-559 by the State of Tennessee Department of Environment and Conservation. The purpose of this investigation was to collect information concerning conditions at the Site sufficient to assess the threat posed to human health and the environment and to determine the need for additional CERCLA/SARA or other appropriate action.

The scope of this investigation included on-site reconnaissance visits, and the sampling of environmental media. The information gathered was utilized to support evaluation of this Site under the Hazard Ranking System (HRS). The site inspection included a review of hazardous substances potentially present at the Site, a review of previous site assessment data, gathering information and supporting documentation to characterize the human population and adjacent environment that could be impacted by any contamination present at this Site, and interpretation of analytical results.

2. SITE CHARACTERISTICS, OPERATIONAL HISTORY AND WASTE CHARACTERISTICS

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2.1 Location

The Smokey Mountain Smelters (SMS) Site consists of three land parcels and a large, rectangular, metal building located just outside of the city limits of Knoxville, in Knox County, Tennessee, on Maryville Pike, State Secondary Route 33 (Vicinity Map, Figure 1). The geographic coordinates of this facility, at the toe of a waste pile near a leachate spring (Appendix 3), are 35 degrees, 55 minutes, and 03.1 seconds North Latitude, and 83 degrees, 55 minutes, and 39.8 seconds West Longitude, placing it in the fifth nth of the Knoxville Quadrangle (0147NW). The immediate area surrounding the facility is medium commercial and residential development. The property location, 1508 Maryville Pike, is that listed for the parcel upon which the process building lies (Appendix 1, Ownership Card, Parcel 1).

To access the Site from Knoxville, travel Henley St./U.S. 441/Chapman Hwy. south approximately one mile past the Tennessee River to a traffic light where Maryville Pike intersects on the right. Travel south on Maryville Pike/State Secondary Route 33

approximately 1.8 mile to Caleb Ave. on the left, just before the Maryville Pike overpass of the CSX Railroad. The entrance to the Site is at the other end of the 500 feet length of Caleb Ave. To access the Site from Knoxville's McGee Tyson airport travel 3.2 miles north on Alcoa Hwy./U.S. 129, right onto Gov. John Sevier Hwy./State Secondary Route 168 for one mile to Maryville Pike/ State Secondary Route 33, then north for 2.7 miles to Caleb Ave. on the right just after the overpass of the CSX Railroad.

East Tennessee does not lie directly within any of the principle storm tracks that cross the country. The area is influenced primarily by storms that pass along the Gulf Coast and thence up the Atlantic Coast, and to a lesser extent by those that pass northeastward from Oklahoma to Maine (Ref 21).

The difference in elevation between mountaintop and valley in East Tennessee causes a considerable variation in temperature. The mean annual temperature of East Tennessee, based upon records from Chattanooga, Knoxville, and Bristol is between 57 and 58 F. Temperature extremes of -32 F in Johnson City and 111 F in Blount County have been recorded. July is the hottest month and January is the coldest. The usual date of the last killing frost ranges from March 30 in Hamilton County to May 10 in Johnson and Carter Counties. The usual date of the first killing frost ranges from October 5 in Johnson and Carter Counties to October 30 in Hamilton County. The growing season varies from 150 to 210 days, depending upon latitude and elevation.

Precipitation in East Tennessee is controlled in part by topography. It is heavier on the Cumberland Plateau and in the Unaka Mountains than in the Valley and Ridge province. Moist air masses reach the Valley and Ridge province comparatively dry because, in passing over the mountain on either side, their moisture is condensed and precipitated. Rainfall is well distributed in the study area throughout the year. Knoxville's wettest months are January, February, and March (averaging 4.66, 4.51, and 5.05 inches, respectively) and the driest are September, October, and November (averaging 2.68, 2.62, and 3.07 inches, respectively). Snow occurs only occasionally and lightly in the lowland or valley land, and usually melts within a few hours or days except in shaded areas or near the tops of some of the highest ridges. The 2-year 24-hour rainfall is 3.2 inches (Ref 36).

The topography largely controls the prevailing wind direction. The prevailing winds are from the northeast (15% of the time) and the southwest (12% of the time), but they are relatively light (mean speed is approximately 7.5 mph). Calm conditions exist 11% of the time (Ref 38).

2.2 Site Description

Smokey Mountain Smelters Site consists of a partially barren and partially wooded 29-acre property which contains the remains of an inactive (Ref 50, Ref 51) secondary aluminum smelter (Ref 6) and an inactive fertilizer factory (Ref 20; Ref 21, page 251; Appendix 1, Book 1819, page 689). The Site is accessible from Maryville Pike via Caleb Ave. and a paved driveway with a locked gate. The pavement ends soon after the facility entrance.

The Smokey Mountain Smelters Site, as observed during numerous inspections by TDSF beginning in 1997, consists of one large industrial process building and numerous waste piles

located on parts of three parcels of real estate. The property (Property Map, Figure 3) totals approximately 29.3 acres (see Property Maps and Details Reports, Appendix 1), ranging in elevation from 890 to 940 feet. The large building is approximately 100 feet wide, 300 feet long, and 50 feet high (Ref 20). It houses two natural gas fired rotary furnaces, one casting furnace, a large overhead crane, and provides dry storage for raw materials. Large air ducts lead to two outside baghouses near the southwest corner of the building. A portion of the north wall of the building has collapsed. Features outlying the main building include a small transformer area to the north, a burned office building or house across a paved driveway with truck scales farther to the north, a concrete building foundation to the northeast, two curious jumbled concrete slabs farther to the northeast, Site railroad tracks and a related building to the east, a 25 feet by 100 feet lagoon holding water to the southeast, a maintenance building to the south, and numerous gray-colored waste piles covering most of the remaining property to the south.

March 28, 2002 Aerial Photograph of Smokey Mountain Smelters.

The east, south, and west fringes of the Site are heavily vegetated. The majority of the Site, comprised of the manufacturing operations areas and the waste piles, is very lightly vegetated.

The 1942 USGS topographic map (Ref 46) shows an ordinary drainage swale at a location along the southeast side of the large building which is presently at the Site, and a small

sinkhole in the surface water pathway near the southwest property boundary; the 1966 USGS topographic map (Ref 47) shows two settling ponds in series at the head of a stream in the swale; and the 1978 USGS topographic map (Ref 48) shows the settling pond berms, but no water in the settling pond locations or in the swale. Waste piles now cover the settling pond berms. The now-buried stream channel is also shown on the soil map (Ref 35).

2.3 Operational History and Waste Characteristics

(1) The Knoxville Fertilizer Company, a fertilizer factory utilizing a sulfuric acid tank and a deep well, was located at the Site in February 1922 (Ref 20), and in 1948. An on-site or nearby (Ref 13) industrial well was named for Knoxville Fertilizer Company (Ref 21). Records (2) indicate that American Agricultural Chemical Company owned part of the property in 1963 (Appendix 1, Book 1477, Page 424). In 1965, American Agricultural Chemical Company (3) was merged into Continental Oil Company. Property deeds (Appendix 1, Book 1477, Pages 420-429, and Book 1523, Pages 258-262) indicate that American Agricultural Chemical Company, Continental Oil Company, and Agrico Chemical Company owned part of the Site. (4)

The facility may have operated as a commercial agricultural chemical manufacturing facility several years ago, and could have discharged wastes to settling ponds (Ref 26, Ref 47). No information regarding the regulatory status of this Site prior to 1980 has been found. Agricultural chemical manufacturing includes establishments primarily engaged in manufacturing nitrogenous and phosphatic basic fertilizers, mixed fertilizers, pesticides, and other agricultural chemicals (Ref 19).Agricultural chemical manufacturing includes establishments primarily engaged in manufacturing nitrogenous and phosphatic basic fertilizers, mixed fertilizers, pesticides, and other agricultural chemicals (Ref 19). Rock phosphate (27 - 38% P_2O_5) is the raw material source from which all types of phosphate fertilizers are produced, with the minor exception of basic slag (12 - 18% P_2O_5), which is a by-product of steel production. In its unprocessed state, rock phosphate is not suitable for direct application, since the phosphorus (P) it contains is insoluble. To transform the phosphorus into a plant-available form and to obtain a more concentrated product, phosphate rock is processed using sulphuric acid, phosphoric acid and/or nitric acid. Acidulation by means of sulphuric acid produces either phosphoric acid, an intermediate product in the production of triple superphosphate (TSP), MAP, DAP and complex fertilizers, or single superphosphate (SSP). Acidulation using phosphoric acid produces TSP, and acidulation using nitric acid produces NP slurries for use in the manufacture of complex fertilizers (Ref 3).

Smokey Mountain Smelters, a.k.a. Rotary Furnace, Inc., of 1455 [SIC] Maryville Pike, was established in 1979 (Ref 32, Ref 50). In September 1979 David A. Witherspoon, Jr. and Daniel E. Johnson purchased several tracts of the Site's property (Appendix 1, Book 1691, Page 646). The 1455 street number was submitted by Mr. Johnson to the Knox County Department of Air Pollution Control (KCDAPC) on a permit application (Ref 6), and the facility's address was always referred to as 1455 Maryville Pike thereafter by KCDAPC. Smokey Mountain Smelters, Inc., 1455 Maryville Pike (Ref 50), was issued the ID # TND098071061 by the U.S. EPA Office of Air and Radiation. The 1455 Maryville Pike address may be an error on the aluminum smelter air contaminant source application. A contaminant source is not known to exist at 1455 Maryville Pike. Smokey Mountain

Smelters, 1508 Maryville Pike, Knox County, Tennessee, 37920, was assigned the identification number of TN0002318277 by the U.S. EPA (Ref 44).

In 1983, the TN Division of Solid Waste Management intended to issue a Notice of Violation for operating a landfill without a permit (Ref 24). A geologic evaluation of the Site concluded that the Site was unsuitable for use as an industrial landfill (Ref 25, Ref 26). One estimate of the waste generation rate was 90-120 cubic yards per week (Ref 27) approved as a special waste for disposal at a permitted solid waste disposal facility. It is unknown if any of this waste was ever taken to a permitted solid waste disposal facility. Much of the waste was dumped on-site, and some of this may have been buried (Ref 7, Ref 1). The dump historically had an ammonia odor, was not fenced in on all sides, and often was burning (Ref 7, Ref 8). The Knox County Department of Air Pollution Control received numerous complaints (Ref 2, Ref 10) about the facility, performed many inspections, and cited many violations (Ref 8, Ref 10).

The facility was entered into the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), with August 6, 1997, as the discovery date (Ref 14). On the basis of data and information contained in the 1998 Preliminary Assessment of the Site, the Agency for Toxic Substances and Disease Registry (ATSDR) assessed the public health impact of environmental contamination, stating that further site evaluation is warranted as additional information becomes available (Ref 40). The ATSDR's Health Consultation Report contained the following conclusions and recommendations:

CONCLUSIONS

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1) Based on limited data, the concentrations of contaminants detected in on-site, solid waste materials do not pose a public health hazard under current site conditions.

2) Information is not available to assess the potential impact of site-related contamination on groundwater and ambient air quality in the area.

3) The unstable condition of the industrial process building poses a physical hazard to trespassers.

RECOMMENDATIONS

1) Further characterize the extent and nature of the on-site and possible off-site contamination.

2) Investigate the potential impact of contamination on groundwater quality in the area. This should include a survey of private well use in the area.

3) Investigate the potential impact of contamination on ambient air quality in the area.

4) Restrict public access to the industrial process building.

The Site Investigation Report for the Smokey Mountain Smelters Site was issued in November 1998, concluding that the Site has the potential to be placed on the National Priorities List (NPL).

Raw materials included aluminum dross; the product was aluminum ingot (Ref 50). Records from the office of the facility indicated that "pot pads" were processed at this facility (Ref 17, pages 10, 11-13, 15-17, 19, 21, 42). In the primary production of aluminum, pot pads are generated with spent potliners. Spent potliners are listed Hazardous Wastes, designated as K088. Other raw materials included aluminum pot bottoms and similar materials, bath pads, and crushed material containing non processible carbon, iron, cryolite (Na_3AlF_6), dust, etc. (Ref 17). Sometimes there were agreements that these materials were not owned by Smokey Mountain Smelters. Raw materials also included aluminum scrap (Ref 18), pot bottoms, pot pads, hood pads, crushed materials, etc., and may have included any material that contained some aluminum. Large blocks of black, carbon-like materials, stored inside the building, resemble spent anode or cathode materials from primary aluminum production. Such materials might contain some amount of recoverable aluminum, within a water-reactive conglomerate waste material. Unprocessed raw materials may now be present at the Site. Unapproved materials were sometimes charged to the rotary furnaces (Ref 10).

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Numerous records were obtained from the office at Smokey Mountain Smelters (SMS). These records indicate that between 1985 and 1992 (Ref 17, pages 5-19,21) a primary aluminum production facility in Alcoa, TN, sent large quantities of their materials to the Site, and that large quantities of hazardous substances and other contaminants, derived from materials that had been sent by the primary aluminum facility, are still present at the Site. Records indicate that these materials included process oily scalper chips, furnace bottoms, magnetic separator accumulations, tabular balls, selee filters, south ingot furnace bottoms, mold line floor sweepings, can rec skim, and miscellaneous materials from north plant ingot (Ref 17, pages 24-33), and bath pads, scrap aluminum, crushed material, and pot pads (Ref 17, pages 40-45), and bricks and non processible bath, concrete, lancing rods, trash, steel, carbon, iron, cryolite, dust, pallets, etc. (Ref 17, pages 4-22). An associated aluminum facility in Newburgh, IN, may have also sent filter drains and ingot slabs to SMS (Ref 17, pages 34-37). Another associated aluminum facility in Badin, NC, sent pot pads (Ref 17, page 15). These records indicate that only a fraction of these materials were processed and only a fraction of the processed materials were recovered as aluminum alloy (aluminum containing other substances) and returned to the primary aluminum production facility or the associated facilities. The unrecovered materials included saltcake and other residues resulting from the processing of materials, which were known to require adequate handling and disposal to protect the environment (Ref 17, pages 38-39).

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A letter of inquiry to SMS, dated 05-09-91, regarding SMS's handling and disposal of saltcake and other residues resulting from the processing of an aluminum production facility's skim and/or scrap (Ref 17, pages 38-39), was followed by an agreement for SMS to dispose of saltcake residue material generated from certain materials at an off-site landfill (Ref 17, pages 46-49). The records indicate that the primary aluminum production facility

was invoiced by SMS for two occurrences of off-site disposal of a limited amount of waste (Ref 17, pages50-54).

A Uniform Commercial Code-Financing Statement (Ref 17, pages 55,56) signed by the Bailor-Secured Party (a potentially responsible party, but not SMS) and the Bailee-Debtor: Smokey Mountain Smelters states, in part, the following:

> "This financing statement covers...aluminum pot bottoms and similar materials. Secured Party is the owner of all such items insofar as Debtor is merely a bailee and has no rights in such materials or the proceeds or products thereof except as a bailee."

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A Bailment and Security Agreement (Ref 17, pages 57-60) dated 04-18-80 and signed by the Bailor-Secured Party (a potentially responsible party, but not SMS) and the Bailee-Debtor: Smokey Mountain Smelters states, in part, the following:

> "Whereas, it is the desire and intention of the parties that such materials and goods and all products, final or intermediate, made therefrom, shall remain at all times the exclusive property of the Bailor-Secured Party..."

Numerous records between 1982 and 1995 (Ref 17, pages 11-14, 20,22) indicate that this potentially responsible party sent large quantities of their materials to the Site, and that large quantities of hazardous substances and other contaminants still owned by this potentially responsible party (Ref 10,11,12), are still present at the Site.

Wastes included baghouse dust and dross residues. For every 1 million pounds of scrap processed, 760,000 pounds of secondary aluminum is produced, and 240,000 pounds of dross residues, and 3,000 pounds of baghouse dusts are generated. The dross residues contain extremely corrosive and water-soluble salts (Ref 41) containing aluminum nitride, sodium and potassium chlorides, heavy metals and other potential contaminants. Salt cake in water emits toxic and explosive gases such as hydrogen, ammonia, methane, phosphine, acetylene, hydrogen cyanide, and hydrogen sulfide. Baghouse dusts may contain Cd and Pb above the limits of the EPA Toxicity Characteristics Leaching Procedure (TCLP) test. Lithium and fluoride compounds may be present due to the use of lithium carbonate, aluminum fluoride, and cryolite (Na_3AlF_6) in aluminum production (Ref 5).

Large black, carbon-like blocks which could be anode or cathode wastes from primary aluminum production were observed at the Site during numerous inspections by the TDSF beginning in 1997. Baghouses and baghouse dust from secondary aluminum smelting and casting are present. Dross and slag (Ref 5) from aluminum production is present. Other wastes, or constituents thereof, are expected to be present. Unapproved materials were sometimes charged to the rotary furnaces (Ref 10). Scrap aluminum was a raw material.

An ammonia odor coming from the waste mixture is often noticeable. The presence of ammonia in the atmosphere has been measured. The atmospheric reactions of trace ammonia gases are known to include formation of ammonium sulfate and oxidation to nitrate (Ref 49).

Inhalation of ammonia can cause irritation of the eyes, nose, and throat (Ref 39). "Smelt" is the inflected form of "smelled", implying odorous, gaseous emissions. Smokey Mountain Smelters, 1508 Maryville Pike, was primarily engaged in recovering aluminum and alloys from new and used scrap and dross (Ref 26) using a gas-fired rotary furnace, and was classified as a secondary aluminum smelter, SIC 3341 (Ref 19), and a potential air contaminant source (Ref 9) that could emit hazardous air pollutants including 2,3,7,8-tetrachlorodibenzo-p-dioxin (Ref 42). Operations continued until at least April 1995 (Ref 17).

Materials at the Brantley Landfill, KYD980501019, Green River Disposal, Inc., KYD980501076, and Ft. Hartford Coal Co. Stone Quarry, KYD980844625, may have similarities to the materials found at Smokey Mountain Smelters (Ref 16). The Brantley Landfill, Green River Disposal, Inc., and Ft. Hartford Coal Co. Stone Quarry were placed on the NPL. Other sites with potentially similar materials may include Red River Aluminum, AR0000605322, Bens Run Recycling Consolidate Aluminum, WVD988774626, American Resource Recovery, WID988584033, Primary Recovery Corporation, KYD119100071, Reynolds Metals Co, NYD002245967, Mideast Aluminum, NJD001775626, and Gettysburg Foundry, PAD003009362.

The Brantley Landfill contains 250,000 tons of aluminum dross. The dross contains heavy metals (including barium, cadmium, chromium, lead, copper, and manganese) and reacts violently with water to form several gases, including ammonia.

3.0 WASTE/SOURCE SAMPLING

3.1 Sample Locations

Six waste samples were collected during September 2002. These sample locations are shown in Figure 4B. These sample descriptions are summarized in Table 1. Four of these samples were collected from waste piles inside the process building. The other two samples were collected from wastes located outside the process building. One baghouse dust sample was collected from several containers located under the two baghouses. One ash sample was collected from a broken smokestack at one of the baghouses.

Other waste/source samples, (not including contaminated sediment/soil samples) were collected in October 1997, August 1998, March 2001, and October 2004. The locations and descriptions of these ten waste samples are indicated in the Preliminary Assessment Report, the Site Inspection Report, or Figure 4C (leachate location), and are briefly described in Tables 2 and 2A. Three of these samples were collected from waste piles inside the process building. One sample was collected from baghouse dust located outside the process building in several containers located under the two baghouses. Four samples were collected from waste piles outside the process building. The other two samples were collected from a leachate spring at the point of exit from a waste pile, indicated on Figure 4C.

3.3 Analytical Results

Waste sample toxicity tests, analytical results, requests, and chain-of-custody information are presented in Appendix 2 and summarized in Tables 2 and 2A, "Waste Analytical Data Summary".

The analytical results of waste samples indicated the presence of several hazardous substances. The observed release criteria were satisfied for all detected classical/nutrient, inorganic, extractable organic, and volatile organic substances. The most observed releases occurred for inorganics. High values of aluminum were found in the wastes, as would be expected. Chromium, lead, and pesticides were found at potentially RCRA-characteristically-toxic levels. When requested, ammonia was reported to be present in all waste samples collected in previous inspections. Previous inspection has revealed increasing values of pesticide compounds at greater depths in the waste piles near the old settling ponds. Evidence suggests that an agricultural chemical manufacturing facility may have discharged wastes to settlings ponds that were later covered with aluminum smelting wastes. The concentration of pesticide compounds on the surface of waste piles is expected to be low.

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Waste analyses indicated several exceedances of several criteria of concern. Most of the 14 solid waste samples had high levels of aluminum, antimony, arsenic, cadmium, chromium, copper, lead, nickel, and zinc. Leachate contained several substances at concentrations expected to be acutely or chronically toxic to aquatic life. Laboratory methods for measuring the acute toxicity of the leachate to freshwater organisms indicated the extreme acute toxicity of LC_{50}<1.56% (at least 50% lethal to freshwater organisms at less than 1.56% effluent concentration). Bisphenol A, a known endocrine disruptor, was tentatively identified in leachate.

3.4 Conclusions

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Wastes containing CERCLA hazardous substances related to secondary aluminum smelting and agricultural chemical operations are present in waste piles covering much of the Site. Large quantities of all substances detected in wastes may have been managed and disposed of at the Site for many years, and some may be buried (Ref 1). Buried wastes, if present, were not investigated during this ESI. Subsurface wastes, if present, may not be adequately characterized.

Other waste characteristics require applicable or relevant and appropriate Clean Water Act (CWA) standards for the leachate discharge including, but not necessarily limited to, standards for pH, temperature, chlorides, dissolved residue, and ammonia, if any[1].

[1] *CWA regulations that are most likely to be ARARs at Superfund sites are standards governing direct discharges to surface waters, indirect discharges to publicly owned treatment works (POTWs), and discharges of dredge-and-fill materials into U.S. waters.*

The CWA controls the direct discharge of pollutants to surface waters through the National Pollutant Discharge Elimination System (NPDES) program (CWA §402), which contains both substantive and administrative standards that may be ARARs. Potentially applicable substantive NPDES standards include technology-based pollutant controls, or effluent standards, governing surface water discharges. A NPDES effluent control technology, could, for example, be applicable to the discharge of a treated CERCLA wastewater to any surface water. Administrative NPDES standards, such as permit and certification requirements, are applicable to CERCLA discharges to off-site surface water. CERCLA response actions frequently trigger administrative NPDES standards, because only surface water that is within or in very close proximity to an AOC is considered on site. The NPDES program also includes ambient water quality standards that could be relevant and appropriate to CERCLA discharges, depending on the designated and potential uses of affected surface waters, and other factors (§300.430(e)(2)(i)(e)). Ambient water quality standards include federal water quality criteria (FWQC) and state water quality standards (WQS), which set concentrations of pollutants considered adequate to protect surface waters for various uses, and state antidegradation standards, designed to protect existing uses of waters and maintain water quality.